NASAFacts

Flight Opportunities Program Overview

The Flight Opportunities Program (FOP) was incorporated into the newly established Space Technology Program, as managed by the Office of the Chief Technologist (OCT). The Space Technology Program serves as the Agency's technology development and demonstration engine, working with industry, academia, other government agencies and international partners to conceptualize, develop, build, test and demonstrate key space capabilities that work toward flight readiness status by testing in space-relevant environments. Such capabilities are required for NASA's future missions and those of other government agencies, as well as for the nation's aerospace enterprise.

Flight Opportunities provides an increased opportunity for flight testing by purchasing flight services from emerging, commercial suborbital platform providers and facilitating access to reduced gravity environments, brief periods of weightlessness and high-altitude atmospheric conditions.

The Flight Opportunities Program attains paths for the development of technology payloads, payload integration services and commercial suborbital space transportation services that provide opportunities to fly in space-relevant environments, including extended periods of microgravity. Flight Opportunities also procures flights on commercial parabolic vehicles to test technologies in environments that simulate microgravity and the reduced gravity environments of interest, such as the Moon or Mars.

NASA recognizes the importance of supporting commercial reusable sub-orbital and parabolic activities and its role in advancing future science and exploration technological capabilities. In addition, suborbital platforms provide critical training opportunities needed to sustain a skilled aerospace workforce capable of meeting our Nation's exploration and technology development objectives. One of the greatest challenges NASA faces in advancing cutting-edge technologies is bridging the gap between testing a component or prototype in a laboratory or ground facility environment, and demonstrating the technology or capability in a mission-relevant operational environment, such as those that suborbital platforms provide.

The price tag of access to space remains prohibitively expensive for most researchers, with launch costs to low-Earth orbit ranging from $10,000 to $15,000 per pound for small payloads. Adding these launch costs to the price of developing hardware and producing operations capability presents a major hurdle in the maturation of compelling space technologies. Without the ability to perform these critical relevant environment tests not only do these new technologies remain on the shelf, but the workforce that might otherwise gain the experience to employ these new approaches remains underutilized and untrained. A key parameter for space capabilities is proving performance in a micro-gravity environment. It is this gap between non-micro-gravity ground-based testing and very expensive orbital demonstrations, where commercial reusable suborbital launch vehicles offer an enormous potential. Micro-gravity flights provide the potential for relevant environment testing at a small fraction of the costs required for orbital flights.

Under contract with NASA, providers of commercial suborbital reusable launch vehicle (sRLVs) will deliver payload integration and suborbital space transportation services for 3-4 minutes of microgravity, other selectable levels of low-gravity, and high altitude environments for technology development and related research. Several emerging sRLVs have been competitively selected to fly technology payloads.

Commercial Flight Service Providers

A primary means of providing relevant environments to researchers is through the use of suborbital launch vehicles that are commercially available and reusable. Acting as a pathfinder, Flight Opportunities increases utilization of commercial reusable suborbital vehicles by supporting flight providers to ensure the maximum number of scientific and technology development payloads that are onboard the suborbital platform. Flight Opportunities targets industry, academia and government-funded science and technology payloads, and opens opportunities to Science, Technology, Engineering, and Mathematics (STEM) education experiments from students and teachers.

Zero-G Corporation will provide commercial parabolic flights that will test technologies in seconds-duration periods of micro-gravity and at selectable low-gravity levels such as those on the Moon or Mars. The modified commercial aircraft with an open, padded interior flies a series of short (15-30 seconds) parabolic trajectories to repeatedly simulate the desired gravity levels.

In addition to the parabolic flights on a modified commercial aircraft, the FOP currently intends to fund flights on six suborbital, reusable commercial flight platforms and one high-altitude balloon platform as listed:

- Armadillo Aerospace, Heath, Texas
- Near Space Corp., Tillamook, Ore.
- Masten Space Systems, Mojave, Calif.
- UP Aerospace Inc., Highlands Ranch, Colo.
- Virgin Galactic, Mojave, Calif.
- Whittinghill Aerospace LLC, Camarillo, Calif.
- XCOR Aerospace, Mojave, Calif.

These commercial flight providers will also be funded to provide payload integration and related ground-based support services for NASA-sponsored payloads.

These commercial vendors are at various stages of development of their flight vehicles -- some have flown, while others are still in development. Selections were made on the basis that the provider showed evidence of a capability to provide flight services within a two-year period of performance.

Providing the indefinite delivery, indefinite quantity (IDIQ) contracts and purchasing these flight provides a base market for the vehicle vendors at a strategically important time period when several of the vendors are transitioning from design and development to flight testing. Subsequent tasks will be issued to the pool of seven providers to accommodate NASA's specific payload requirements as these providers mature their commercial vehicles to flight status.

Payload Proposal Selection & Flights

Technology payload proposals are sought from many sources including NASA, other government agencies, academia, industry, and international entities collaborating with U.S. partners. For selected payloads, the program funds flights and re-flights, if warranted. Proposal selection criteria includes assessments of: applicability to NASA high-priority technology areas; the opportunity for technology risk reduction; the technology and payload readiness level for a flight demonstration; and the adequacy of the proposing team's experience to deliver a safe payload for flight.

The Flight Opportunities Program has taken steps in Fiscal-Year 2011 to increase development of payloads for conducting small-scale experiments. There are two primary activities: 1) release of an Announcement of Flight Opportunities (AFO) for payloads wherein NASA provides the flight opportunity, and 2) development of a NASA Research Announcement (NRA) for technology development payloads wherein NASA provides funding for the development activity and the flight.

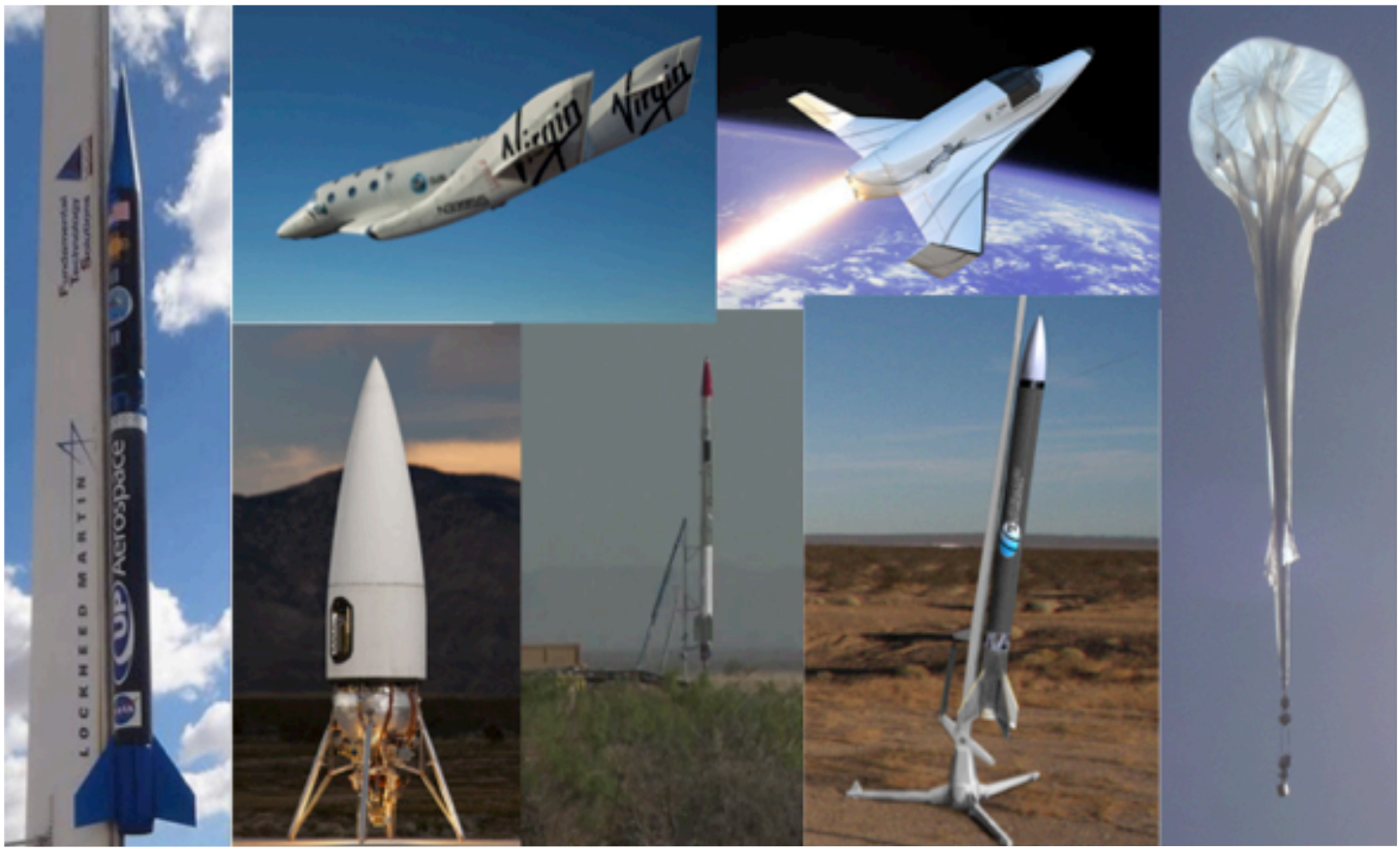
Recent Activities & Accomplishments

• Parabolic campaigns were flown in July, August and September 2011 with good success resulting from each of the 18 payloads. The FOP team partnered with the experienced Johnson Space Center (JSC) Reduced Gravity Office team to streamline the payload flow and flight readiness review process at the Ellington AFB ground operations center. Valuable lessons were learned that will improve future parabolic campaigns and are anticipated to positively influence the early suborbital flights, as well.

• A suborbital vehicle-developed adjustable payload rack was developed and two small, autonomous payloads were procured, tested and integrated with it for flight-related compatibility assessments with an evolving Masten sRLV.One payload is a commercial flight vehicle environmental monitoring and recording system and the other is commercial GPS-linked vehicle location sensing and broadcast system provided by the FAA.

• The FOP team coordinated the solicitation, evaluation and selection of five new payloads for early suborbital flights and five new payloads for parabolic flights. These campaigns are projected for March/April 2012. In addition, 35 new proposals have been submitted in response to an Announcement of Opportunities for payloads that was issued in November 2011. Selections of proposals from this latest announcement are due to be made in February 2012.

Flight Opportunities, part of the Space Technology Program, is managed at NASA's Dryden Flight Research Center in Edwards, Calif. NASA's Ames Research Center in Moffett Field, Calif., manages the payload activities for the program.



Natiional Aeronautics and Space Administration

Dryden Flight Research Center
P.O. Box 273
Edwards, CA 93523-0273